

*Aggregation of FAF OD Data*

FAF OD AADTT data provide trip interchanges between Os and Ds at the county level for the entire US. However, in external zones other than North Carolina, such detailed OD data is not necessary because we are not interested in detailed flow estimates beyond NC. External TAZs are BEA districts; hence, the OD county level data are aggregated to the BEA district level using TransCAD. A correspondence table is developed which shows all the continental US counties that belong to each BEA district. (Appendix B shows a sample of the correspondence table. The entire 65 page document for all 3120 counties and 179 BEAs is available separately.). FAF OD county data is then aggregated to BEA districts using the TransCAD ‘Aggregate’ tool and the correspondence table.

*Disaggregation using North Carolina Employment data*

FAF2 OD AADTT data provide truck trip interchanges between Os and Ds at the county level within North Carolina. For the North Carolina truck network model, it is desirable to have Os and Ds at the TAZ level. However, in the North Carolina metro counties, TAZs are at a more disaggregate metro level than the counties. So the OD matrix at the county level has to be suitably disaggregated into a metro TAZ OD matrix. Disaggregation is done based on employment data using TransCAD (Appendix C). The number of employees in a TAZ is estimated by clipping the employment shapefile with each TAZ shapefile. The TAZ shapefile is then populated with an attribute of number of employees based on the results thus obtained from clipping. FAF OD AADTT is then disaggregated from county level to TAZ level using the TransCAD ‘Disaggregate’ tool with the proportion of zone employment to county employment being the disaggregating factor.

*Growing FAF2 Data to Year 2006*

The base year for the North Carolina truck network model is 2006; hence, the 2002 FAF2 OD AADTT flows have to be extrapolated to 2006. The year 2000 census provides the average exponential growth factors for each BEA zone based on Gross Domestic Product (GDP) and the factors to extrapolate the 2002 flows to 2006 for each external BEA zone (Appendix D). In North Carolina, the average exponential employment growth factor for each county comes from the period 2002 to 2006 (Appendix E). The factor is used to extrapolate the 2002 FAF2 OD flows for each county pair to 2006.

The TransCAD Fratar procedure is a widely used procedure for OD updating and therefore was employed to grow the original 2002 FAF2 OD matrix. In the process, the 2002 FAF2 matrix was used as a “seed” matrix and the 2006 zonal productions and attractions as control totals.

With respect to using the exponential growth factors, linear growth factors could have been used over the short two and four year periods to growth traffic to the 2006 base year. Differences between linear and exponential growth over the short time period are less than 2%. A detailed analysis of exponential growth factor versus linear growth factor is discussed in Chapter 4.

In future NC truck models for longer forecasts toward the future year 2020 or beyond the more conservative linear growth factor would be more desirable, or using FAF2 OD estimates for the future.

*Addition of Empty Truck Trips to the FAF2 Trip Matrix*

This section describes in detail how the empty truck trips were added to the FAF2 loaded trip matrix. Specifically, a two-step process was conducted to achieve the resulting trip matrix. The first step adds 30% of the back-haul truck trips to the corresponding “forward-haul” loaded truck trips with an assumption that 30% of the back-haul trucks are empty. While the first step addresses empty trucks, it leaves with us an unbalanced trip matrix as its output where the number of trucks coming out of a zone is not equal to the number of trucks going into the zone on a daily basis. Magnitude of the unbalance could be big or not, all depending on the values in the original FAF2 matrix. But to ensure a balanced trip